

What is claimed is:

1. A display device comprising:

a display panel comprised of a cathode substrate and a fluorescent screen substrate, said cathode substrate including an array of thin-film type electron sources each having a lower electrode, an upper electrode and an electron accelerating layer retained between said lower electrode and said upper electrode, each of said electron sources radiating electrons from said upper electrode in response to a voltage applied between said lower electrode and said upper electrode, said fluorescent screen substrate including a fluorescent screen in which phosphors excited by said electrons to thereby emit light are formed; and

a drive circuit for driving said lower electrode and said upper electrode;

wherein one of said lower electrode and an upper bus electrode is a stripe-shaped electrode in an image display area where said array of thin-film type electron sources of said display panel are disposed in a matrix, said upper bus electrode being provided to feed power to said upper electrode.

2. A display device comprising:

a display panel comprised of a cathode substrate and a fluorescent screen substrate, said cathode substrate including an array of thin-film type electron sources each having a lower electrode, an upper electrode and an electron accelerating layer

retained between said lower electrode and said upper electrode, each of said electron sources radiating electrons from said upper electrode in response to a voltage applied between said lower electrode and said upper electrode, said fluorescent screen substrate including a fluorescent screen in which phosphors excited by said electrons to thereby emit light are formed; and

a drive circuit for driving said lower electrode and said upper electrode;

wherein both said lower electrode and an upper bus electrode are stripe-shaped electrodes in an image display area where said array of thin-film type electron sources of said display panel are disposed in a matrix, said upper bus electrode being provided to feed power to said upper electrode.

3. A display device comprising:

a display panel comprised of a cathode substrate and a fluorescent screen substrate, said cathode substrate including an array of thin-film type electron sources each having a lower electrode, an upper electrode and an electron accelerating layer retained between said lower electrode and said upper electrode, each of said electron sources radiating electrons from said upper electrode in response to a voltage applied between said lower electrode and said upper electrode, said fluorescent screen substrate including a fluorescent screen in which phosphors excited by said electrons to thereby emit light are

formed; and

a drive circuit for driving said lower electrode and said upper electrode;

wherein each of said thin-film type electron sources is provided between adjacent ones of stripe-shaped upper bus electrodes at least in an image display area;

wherein said upper electrode formed as a film in said image display area is connected to one of said upper bus electrodes in a corresponding pixel, and separated from other upper bus electrodes in adjacent pixels, so that individual pixels are separated from each other.

4. A display device comprising:

a display panel comprised of a cathode substrate and a fluorescent screen substrate, said cathode substrate including an array of thin-film type electron sources each having a lower electrode, an upper electrode and an electron accelerating layer retained between said lower electrode and said upper electrode, each of said electron sources radiating electrons from said upper electrode in response to a voltage applied between said lower electrode and said upper electrode, said fluorescent screen substrate including a fluorescent screen in which phosphors excited by said electrons to thereby emit light are formed; and

a drive circuit for driving said lower electrode and said upper electrode;

wherein each of said thin-film type electron sources is provided between adjacent ones of stripe-shaped upper bus electrodes at least in an image display area;

wherein a film of said upper electrode formed in said image display area is connected to one of said upper bus electrodes in a corresponding pixel, and separated from other upper bus electrodes in adjacent pixels due to a step of an appentice structure formed on one side surface of said upper bus electrode in said corresponding pixel, so that individual pixels are separated from each other.

5. A display device according to Claim 3 or 4, wherein said stripe-shaped upper bus electrodes are formed one by one per pixel in accordance with a pitch of pixels, and each of said stripe-shaped upper bus electrodes has not only a function as said upper bus electrode for feeding power to said upper electrode but also a function as an electrode for giving potential to spacers inserted between said cathode substrate and said fluorescent screen substrate for supporting said two substrates.

6. A display device comprising:

a display panel comprised of a cathode substrate and a fluorescent screen substrate, said cathode substrate including an array of thin-film type electron sources each having a lower electrode, an upper electrode and an electron accelerating layer retained between said lower electrode and said upper electrode,

each of said electron sources radiating electrons from said upper electrode in response to a voltage applied between said lower electrode and said upper electrode, said fluorescent screen substrate including a fluorescent screen in which phosphors excited by said electrons to thereby emit light are formed; and

a drive circuit for driving said lower electrode and said upper electrode;

wherein each of said thin film type electron sources is provided between a stripe-shaped upper bus electrode and a stripe-shaped spacer electrode at least in an image display area;

wherein said upper electrode formed as a film in said image display area is connected to said upper bus electrode and separated from said spacer electrode;

wherein said upper electrode is isolated from said spacer electrode and said upper bus electrodes of said thin film type electron sources present in adjacent rows (or columns);

wherein spacers for supporting said cathode substrate and said fluorescent screen substrate therebetween are disposed on said spacer electrode.

7. A display device comprising:

a display panel comprised of a cathode substrate and a fluorescent screen substrate, said cathode substrate including an array of thin-film type electron sources each having a lower

electrode, an upper electrode and an electron accelerating layer retained between said lower electrode and said upper electrode, each of said electron sources radiating electrons from said upper electrode in response to a voltage applied between said lower electrode and said upper electrode, said fluorescent screen substrate including a fluorescent screen in which phosphors excited by said electrons to thereby emit light are formed; and

a drive circuit for driving said lower electrode and said upper electrode;

wherein each of said thin film type electron sources is provided between a stripe-shaped upper bus electrode and a stripe-shaped spacer electrode at least in an image display area;

wherein said upper electrode formed as a film in said image display area is connected to said upper bus electrode and separated from said spacer electrode by a step of an appentice structure formed in a side surface of said spacer electrode;

wherein said upper electrode is isolated from said spacer electrode and said upper bus electrodes of said thin film type electron sources present in adjacent rows (or columns);

wherein spacers for supporting said cathode substrate and said fluorescent screen substrate therebetween are disposed on said spacer electrode.

8. A display device comprising:

a display panel comprised of a cathode substrate and a fluorescent screen substrate, said cathode substrate including an array of thin-film type electron sources each having a lower electrode, an upper electrode and an electron accelerating layer retained between said lower electrode and said upper electrode, each of said electron sources radiating electrons from said upper electrode in response to a voltage applied between said lower electrode and said upper electrode, said fluorescent screen substrate including a fluorescent screen in which phosphors excited by said electrons to thereby emit light are formed; and

a drive circuit for driving said lower electrode and said upper electrode;

wherein each of said thin film type electron sources is provided between stripe-shaped first and second upper bus electrodes at least in an image display area;

wherein said upper electrode formed as a film in said image display area is connected to said first and second upper bus electrodes;

wherein a stripe-shaped third electrode is further provided at least in said image display area so as to be formed in parallel with said first and second upper bus electrodes;

wherein said upper electrode is separated by a step of an appentice structure formed in a side surface of said third electrode, and isolated from said upper bus electrodes of said

thin film type electron sources present in adjacent rows (or columns);

wherein spacers for supporting said cathode substrate and said fluorescent screen substrate therebetween are disposed on said third electrode.

9. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein said upper bus electrode includes a non-stripe-shaped portion outside said image display area.

10. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein each of said stripe-shaped upper bus electrode and said stripe-shaped spacer electrode has a laminated film structure of at least two layers of metal thin films.

11. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein each of said stripe-shaped upper bus electrode and said stripe-shaped spacer electrode is formed out of at least three metal films in which Cu is put between other metals.

12. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein each of said stripe-shaped upper bus electrode and said stripe-shaped spacer electrode is formed out of at least three metal films in which Cu is put between other metals, and a lower film and an upper film of said at least three metal films are made of Al, Cr, W, Mo, or an alloy of those metals.

13. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein each of said stripe-shaped upper bus electrode and said stripe-shaped spacer electrode is formed out of at



least three metal films in which Cu is put between other metals, and a lower film and an upper film of said at least three metal films are made of Al, Cr, W, Mo, or an alloy of those metals, while said upper film of said at least three metal films is thicker than said lower film.

14. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein said stripe-shaped upper bus electrode and said stripe-shaped spacer electrode are used as scanning lines for matrix driving of said display panel.

15. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein said stripe-shaped upper bus electrode is formed out of a laminated film of a thin film formed by sputtering and a conductive thick film formed by printing.

16. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein a thin film portion of said upper bus electrode is comprised of at least two films, having a step structure to connect with said upper electrode on one side surface of wiring of said upper bus electrode, and having an appendice structure to separate said upper electrode on the opposite side surface of said wiring of said upper bus electrode.

17. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein said stripe-shaped upper bus electrode is formed out of a laminated film of a thin film formed by sputtering and a conductive thick film formed by printing, and said conductive thick film is an electrode containing Ag.

18. A display device according to any one of Claims 1 to 4 and 6 to 8, wherein said stripe-shaped upper bus electrode is formed out of a laminated film of a thin film formed by sputtering and a conductive thick film formed by printing, and said conductive thick film is an electrode containing Ag, while said upper bus electrode is used as a scanning line for matrix driving.